

other, or that the average should be taken over a time which was at least five times longer than the period between gusts.

It was found throughout that comparisons of this kind were more trustworthy on occasions when the gusts seemed to be traveling as cylindrical eddies with horizontal axes. If the axes were tilted or vertical, the extra fluctuations in direction rendered the readings much more erratic and difficult to interpret. Near prominent topographical features, or buildings, such effects were very marked.

SUMMARY.

1. A comparison between the wind velocities determined with a Robinson cup anemometer at an elevation of 40 feet and those calculated from observations on a pilot balloon drifting past it, showed a very satisfactory agreement between the two methods of observation under open-air conditions.

work, and takes great pleasure in recording his indebtedness. It is also a pleasant duty to thank Lieut. E. Bieler for his kind assistance in taking simultaneous observations.

SOUTHERN CALIFORNIA WINDSTORM OF NOV. 24-26, 1918.

By FORD A. CARPENTER, Meteorologist.

[Dated: Weather Bureau, Los Angeles, Feb. 6, 1919.]

During November, 1918, southern California experienced the heaviest wind for more than two score years. The highest wind ever recorded since the establishment of the weather service in southern California occurred at Mount Wilson during this wind storm, when the anemometer registered 90 miles an hour.

The article by Special Meteorological Observer W. P. Hoge describes the beginning of this three-day wind and its effects, and his accompanying photograph of the

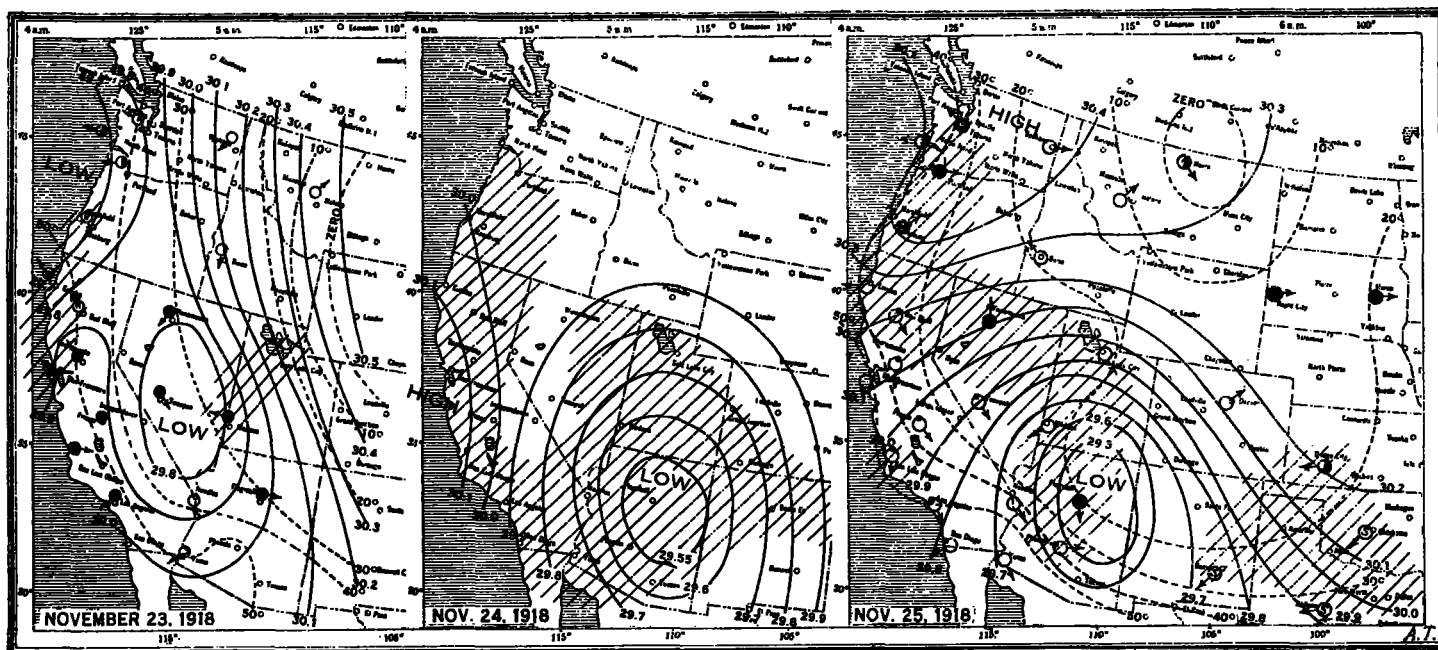


FIG. 1.—Weather maps showing successive positions of the southwestern cyclone, 5 a. m. (120th Mer. time), November 23, 24, and 25, 1918.

2. A simple Pitot tube, which could be constructed with ease in any laboratory, was tested under open-air conditions and found to give satisfactory results with the theoretical formula $v^2 = 2P/\rho$.

3. Its use for the detection and measurement of gustiness was demonstrated. It was found that the relation between the mean gust velocity, the mean lull velocity, and the mean velocity could be satisfactorily investigated with a Pitot tube of this type.

4. The linear hot-wire anemometer as developed by Dr. L. V. King was tested under open-air conditions and appeared to be the most promising of anemometers from the standpoint of precision. The claims of its designer seem to be justified.

5. The kata thermometer which was used as an anemometer for various velocities up to 20 mis./hr. was found to give results in accordance with the other instruments.

Very many thanks are due to Dr. L. V. King for making these incidental tests possible while using the instruments for the acoustical investigation. To Mr. J. Patterson the writer is especially thankful for the opportunity to acquire experience and interest in meteorological

anemometer sheets shows the steadiness of the wind. The damage inflicted on the forest of Mount Wilson is well shown by his photograph (fig. 3) and may be duplicated in many portions of the forest reserve. Shortly after this storm my work took me into the mountains and I found many of the trails partially blocked by fallen timber.

The weather map of the morning of November 23 (fig. 1) showed a well-developed low area entering the southwestern Pacific coast. Storm flags were ordered by the district forecaster stating that a moderate to strong westerly gale would occur within the next 12 to 24 hours. The LOW progressed slowly eastward giving northwesterly gales throughout southern California. Like many disturbances of this character, the LOW disintegrated after three days of life; the weather map of the 25th showing the last distinctive formation of the LOW.

In order to show that the wind of November 23 was of unusual strength it is only needful to compare the curve of hourly velocity of that day with the mean hourly curve of the whole month. (See fig. 2.) The mean hourly ve-



FIG. 3.—Anemometer location on top of the dome, Mount Wilson Observatory solar telescope tower, at a height of 175 feet above ground, or 5,900 feet above sea level. (Photographed by F. A. Carpenter.)

locity for 6 a. m. is 13 miles, while 84 miles was recorded at that hour on the 23d. Mountain stations in this vicinity ordinarily record a maximum velocity for the first half of the day at 6 a. m., and for the last half about

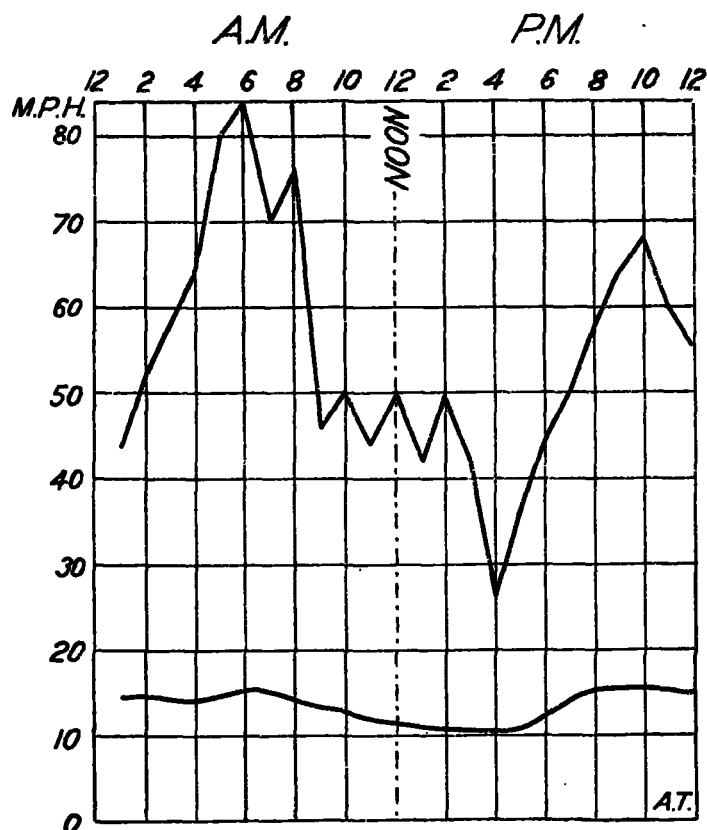


FIG. 2.—Hourly wind velocity on Mount Wilson, Cal., during November, 1918.

10 p. m. At 10 p. m. of the 23d the wind registered 66 miles per hour, or 54 miles above the average for the month at that hour.

The location of the station anemometer on Mount Wilson has been described by Mr. Hoge in his article,

but it is thought that the accompanying photograph (fig. 3) may give increased knowledge as to exposure.

The wind was general throughout southern California on the dates noted, as will be seen by perusal of the table showing wind velocities at neighboring stations. The maximum velocity occurred at all five stations on the 24th but with a distinct lag of 15 hours at Los Angeles and San Pedro, and 5 hours at Arcadia and Santa Monica. The relative position of these stations may be found by consulting fig. 4, which is a projection profile showing the relationship of Mount Wilson to the other stations.

TABLE 1.—Maximum wind velocities during November, 1918.

Station.	Day.	Maximum velocity in 5 minutes, miles per hour.	Direction of maximum velocity.	Time of maximum velocity. (120th Mer.)	Elevation of anemometer above sea.
					Feet.
Mount Wilson.....	24	90	NNW.	4.25 a. m.	5,900
	25	60	NNW.	12.25 p. m.	5,900
	26	48	NNW.	1.00 a. m.	5,900
Arcadia balloon school*.....	24	36	NW.	7.00 a. m.	3,000
	24	80	NW.	10.30 a. m.	11,000
Los Angeles.....	24	38	NW.	12.20 p. m.	458
	25	29	NW.	12.13 p. m.	458
	26	15	NW.	9.43 p. m.	458
Santa Monica.....	24	60	NW.	9.00 a. m.	200
	25	50	NW.	9.00 a. m.	200
	26	48	NW.	1.00 a. m.	200
San Pedro.....	24	45	NW.	11.00 p. m.	112
	25	38	NW.	12.25 p. m.	112
	26	24	SW.	1.00 a. m.	112

* Theodolite observations of pilot balloons.

As to the effect of this windstorm, the greatest damage was to the trees both in the forest and in the cities and towns. Several hundred shade trees were blown down in Los Angeles and Pasadena; and tents were demolished at San Pedro, and shipbuilding was interrupted for a time. The equipment of the balloon school at Arcadia was not injured as upon receipt of the warnings no ascents were made and the balloons were hauled down and securely lashed. No damage resulted on the coast, for the storm-warning displays were generally heeded by the fishermen and masters of other coastwise craft.

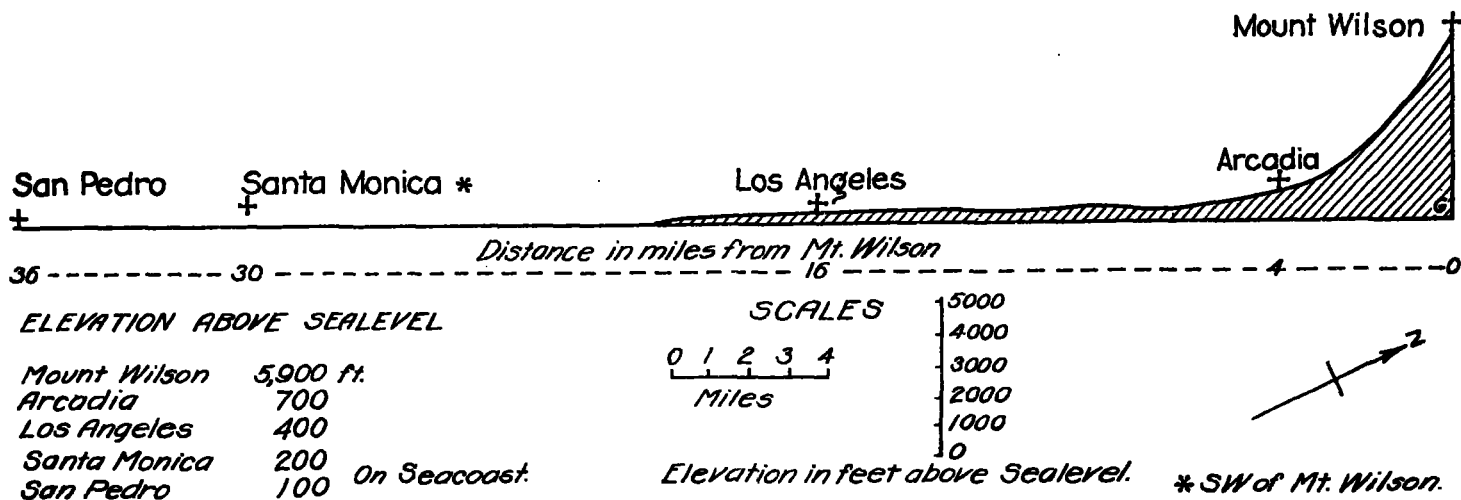


FIG. 4.—Projection profile Mount Wilson to the seacoast.